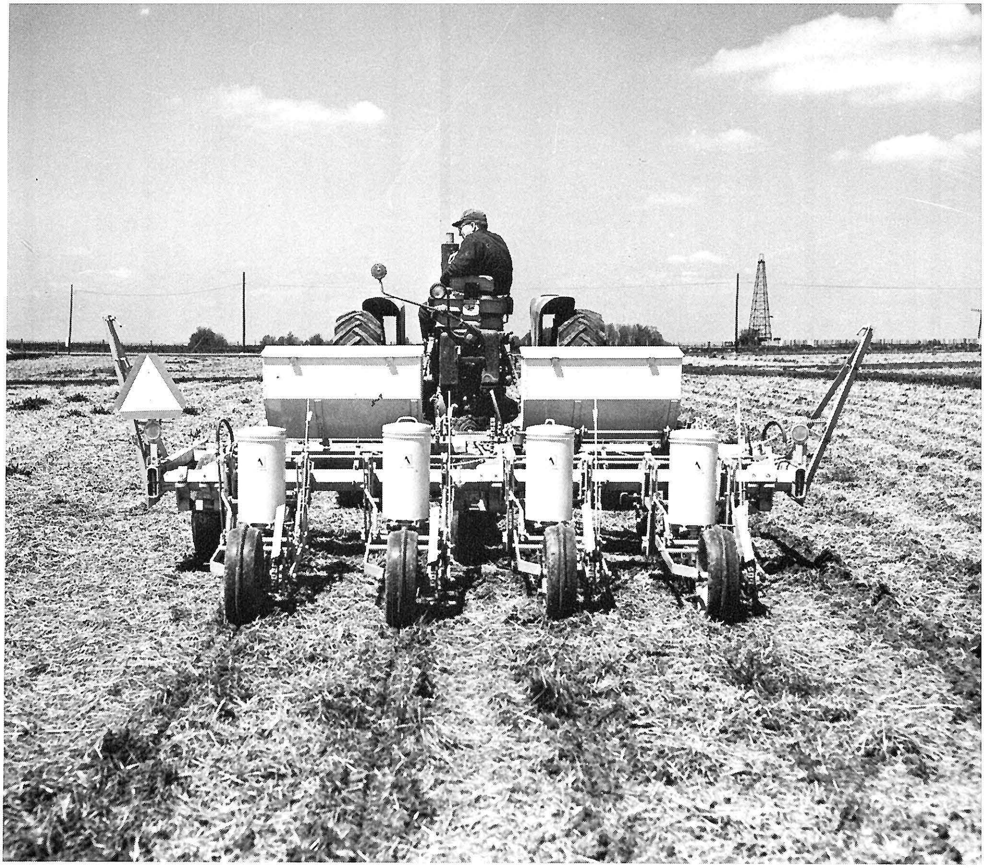

RESEARCH BULLETIN 1068 DECEMBER 1973

An Evaluation of Ohio Soils in Relation to No-Tillage Corn Production

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OHIO AGRICULTURAL RESEARCH AND DEVELOPMENT CENTER
WOOSTER, OHIO

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AGDEX 111/22-518-524

12-73-6M
Reprinted 11-74-5M

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INTRODUCTION

No-tillage corn production has expanded rapidly since its introduction to Ohio farmers, with more than 100,000 acres of corn produced with this technique in 1972. No-tillage offers several distinct advantages over conventional methods of soil preparation:

- No-tillage leaves remains of previous crops on the soil as a mulch which reduces wind and water erosion hazards (1, 7) on sites where these factors are problems. This allows high-yielding corn production on areas considered marginal because of erosion. In fact, a 21% slope planted to no-tillage corn had a soil loss of less than 100 lb. per acre from a 5-inch rain. Soil conservationists consider this well within tolerable limits. No-tillage crop culture on rolling areas is limited more by how well farm equipment can traverse the slopes than by an erosion hazard. The expanded land use potential of no-tillage for sloping areas is greatest in eastern and southern Ohio.
- No-tillage requires much less time for crop establishment than conventional methods (3). Planting and spraying required for no-tillage crop establishment are rapid operations permitting more timely planting and increased capacity for crop production without a major increase in tillage machinery. No-tillage planting is possible whenever the soil is dry enough to plow, a significant factor in years with wet springs such as 1973. There are some indications that fields planted without plowing are more firm and provide better support of harvest equipment during wet autumns. More timely harvest may be possible on areas planted to no-tillage than on plowed areas with the same soil and drainage characteristics.
- No-tillage is not a first choice for some soils, but may be a good alternative to conventional tillage systems. An example is in some areas of northwestern Ohio where the first-choice system on some of the poorly drained soils may be to till the soil in the autumn or early spring several weeks before planting time. If fall or early spring tillage is not accomplished, no-tillage planting may be a better choice than tilling wet soil, with delayed planting and the possibility of decreased stands.
- Finally, no-tillage when properly performed has the highest yield potential of any tillage choice on some soils.

Different soils vary in their response to tillage systems. When all tillage systems involved plowing as a primary operation and varied only in the amount of soil manipulation used to prepare a seedbed, the difference in response to tillage systems was not large. No-tillage, however, represents a great change from plowed systems. The differences in response of several factors, including yield, are large enough to be considered when selecting tillage systems. For some soils under particular conditions, corn grown with the no-tillage system may yield significantly higher than corn grown with a plow-based system. The converse may be true for other soils and growing conditions.

This bulletin evaluates Ohio soils and their suitability for no-tillage corn production. The proposed scheme divides soils into five tillage groups based on location as well as physical and other characteristics. Depending on the tillage group, no-tillage corn production is considered first choice, an alternative choice to plowing, or a practice which should not be considered at all. Most of the research used as a basis for this bulletin has been concentrated on soils in tillage groups 1 and 4. Guidelines for tillage groups 2 and 3 are derived primarily from theory, with limited experience on a few soils. Soils not specifically studied have been placed in tillage groups based on soil profile drainage and other characteristics. This bulletin is not intended as the final answer to selection of tillage systems for individual fields, but as an aid to those desiring to use no-tillage in corn production.

MANAGEMENT OF NO-TILLAGE CROP PRODUCTION

Satisfactory no-tillage crop production requires a high management level and new cultural techniques must be learned by the producer adopting this system. With the limited number of operations required for no-tillage crop production, each operation must be performed satisfactorily because there is little opportunity for successive operations to correct mistakes.

Weed control is a critical area for no-tillage. Herbicide rates and materials satisfactory for conventional tillage may not perform adequately in a no-tillage system. The herbicide application must control weeds for the entire season, since no supplemental cultivation is usually planned. Generally, a mixture of two or more herbicides is needed to control the wide spectrum of vegetation present at planting time. A single herbicide system is not suitable to control all types of vegetation and must be tailored to fit the weed problem.

Insect problems may be greater for no-tillage plantings, especially following a sod or cover crop. Armyworm moths, for example, find the sod an attractive area for oviposition, sometimes resulting in heavy infestations of armyworms in no-tillage fields. Planted fields should be observed during early growth stages for insect infestations and should be treated with acceptable insecticides if they occur.

Plowdown fertilizer application, common for conventional tillage, is not possible with no-tillage planting. Phosphorus and potassium applied to the soil surface are utilized by crops planted without tillage. Band placement of phosphorus and potassium seems to be the best method for most efficient utilization by the crop (4). Nitrogen may be applied broadcast in dry or liquid form. Ammonia (NH_3) may also be knifed into the soil with special applicators. Nitrogen solutions provide a satisfactory carrier for the herbicides. Nitrogen applied broadcast is mobile in the soil and readily available to the crop.

The actual process of *planting* without tillage usually is not a major problem. The residue on the soil surface must be cut and the soil opened. The seed must be dropped 1 to 1½ inches deep in the soil and covered, with adequate seed-soil contact.

Several planters which will function satisfactorily in untilled soil are available. Most of these have rolling coulters followed by double disk or shoe-type openers for seed and fertilizer. Independent suspension of the planter units is desirable so they follow surface irregularities. Planters suitable for no-tillage planting can also be used in tilled soil, giving the grower an option of selecting a plow or no-plow tillage system tailor-made to soils and climatic conditions.

SOIL PROPERTIES AFFECTING PERFORMANCE OF THE NO-TILLAGE SYSTEM

The degree of soil drainage is one of the most important factors to consider in deciding whether or not to use no-tillage. Both surface drainage (water running off or collecting in depressions) and internal drainage (rate the water moves through the soil) must be considered. Seepage may also cause local problems in some fields.

The cooperative soil classification system used in Ohio in the past has provided a 4-digit soil number as well as series names. The third digit of the number relates to soil drainage. For example, the number for Brookston silty clay loam is 6086. Drainage class numbers of 3, 4, 5, and 6 indicate moderately well drained, well drained, excessively well drained, and shallow soils, considering both internal and surface drainage. Soil drainage class 2 soils are somewhat poorly drained and soil drainage classes 1, 7, 8, and 9 are poorly to very poorly drained. The Brookston soil is very poorly drained.

Some of the recently completed county soil surveys and those currently underway employ a letter designation of soils rather than the numerical system described above. The numerical system is still valid for the earlier surveys and an indication of drainage is given in the soil descriptions for the more recent surveys.

Well drained soils, particularly those with low organic matter content which crust but do not fracture upon drying, require mulch cover on the soil surface for proper functioning of the no-tillage system. The mulch is responsible for erosion control. Without mulch as a protective cover on the soil, raindrops more rapidly seal the surface and detach soil particles, causing runoff to occur unchecked. Mulch also reduces evaporation from the soil surface. Reduced evaporation and runoff result in more water available for the corn. Because of these water conservation features, mulch cover has had up to three times greater effect on corn yields on the well-drained soils than any single tillage operation (6).

After a rain, poorly drained soils generally stay saturated at or near the surface longer than the well drained soils. Depressed areas may hold water and its movement through the soil to lower strata is often delayed. These conditions are likely to occur in early spring and if the saturated condition persists after corn is planted, seeds may decay before seedlings have a chance to emerge. Better corn stands have been observed in poorly drained soils plowed and planted early when compared to adjacent areas planted at the same time with no-tillage. Possibly the tillage improved drainage, aeration, or some other factor in the seed zone which was unsatisfactory in the area planted with no-tillage.

Tile or surface drainage helps excess water move out of the soil more quickly. Such improved drainage increases the suitability of soils for no-tillage planting, but may not make poorly drained soils as suited to no-tillage as soils with good natural internal drainage. Corn seeds planted without tillage quite early on poorly drained soil followed by several weeks of extremely wet weather have emerged over tile lines but decayed in areas between the tile lines. Delaying planting until the latter part of the optimum planting period when temperatures are high enough for rapid seedling emergence improves stands for no-tillage on poorly drained soils.

The influence of cropping sequence on crop yields is affected by tillage and drainage. On well drained and moderately well drained soils, no-tillage is equal to conventional tillage for most cropping sequences and decidedly better following sod. Mulch cover, however, must be at a satisfactory level for this to apply. On poorly drained soils, continuous corn planted without tillage has resulted in a yield reduction of 10% to 20% when compared to continuous corn planted in fall-plowed soil. This yield reduction with no-tillage is not as severe in continuous corn if the soil was plowed the previous season. The reason for the yield reduction is not known at this time (5), although research is currently underway to determine the cause.

On poorly drained soils, yields of no-tillage corn following crops other than corn have generally been equal to corn planted in fall or winter-plowed soil. Yields from no-tillage have been better than for corn planted in soil plowed at planting time when planting is delayed into June. Mulch cover usually is not a factor to consider in selection of tillage systems on poorly drained, dark colored soils in Ohio.

SOURCE OF SOILS AND LAND USE ACREAGE DATA

A randomly selected 2% sample of land area in each of Ohio's 88 counties was collected in 1958 and updated in 1967 by soil scientists of the Soil Conservation Service, U. S. Dept. of Agriculture, and the Division of Lands and Soil, Ohio Department of Natural Resources. Data collected in the sample areas included soil type, texture, slope, erosion, and land use. Estimates were made of individual soils or total acreage of several group of soils within specified limits of slope, erosion, and land use within each county or the entire state. More details on this land inventory are contained in the Ohio Soil and Water Conservation Needs Inventory (2).

TILLAGE GROUPS

Soil series in Ohio have been placed into five tillage groups, based on soil properties and their influence on factors relating to response to the no-tillage system. The information contained in the conservation needs inventory was used to estimate the amount of land potentially available for no-tillage corn production within each soil and the total for all soils comprising each tillage group. Land was selected only from pasture, cropland, or idle land use categories. Forest or urban areas were eliminated when calculating acreages. Areas with a slope more than 18% or severe to gully erosion were also excluded. Only names of soils with at least 10,000 acres in one of the land use categories (cropland, pasture, or idle) were listed. Including land currently in pasture in the potential acreage does not imply that pasture areas should be used to produce no-tillage corn. Such areas might be suitable if the slope and erosion parameters are otherwise satisfactory and if economic considerations warrant a shift in land use by the farmer. If such a shift occurs, no-tillage should be used where erosion is a hazard.

Tillage Group 1

With good management, soils included in this group should have yield response to no-tillage equal to or greater than conventional tillage. Soils in this group are moderately well, well, and excessively well drained or shallow (drainage classes 3, 4, 5, 6). They have a silt loam, loam,

TABLE 1.—Soils* of Tillage Group 1 in Thousands of Acres.

Soil Name	Soil No.	Cropland	Pasture	Idle
Alexandria	694T	49.7	27.4	
Allegheny	394	27.6	28.4	
Bratton	574	13.1		
Canfield	713	127.1	41.1	44.7
Cardington	693	260.1	92.0	46.6
Celina	603	244.6	24.0	29.2
Chili	325	76.3	23.1	21.4
Cincinnati	754	29.9	18.2	11.9
Coolville	423	14.2		
Dekalb	4D6	21.0	29.0	
Edenton	756		15.8	
Ellsworth	703	47.7	21.2	29.1
Fox	275	121.0	24.6	19.4
Fox-Miamian	615	17.3		
Gilpin-Westmoreland	4X6	41.0	117.3	12.9
Grayford	784	13.6		
Haney	2D3	19.4		
Hanover	794	48.1	27.8	18.8
Jessup	764	13.8		
Keene	443	39.1	34.4	11.6
Kendallville	605	13.6		
Latham	426		14.2	
London	763	12.3		
Loudonville	746	38.1	24.7	21.5
Miamian	604T	295.1	84.5	46.3
Milton	644	21.5		
Monongahela	393	49.4	41.4	22.2
Morley	6B3	397.2	65.1	60.5
Muskingum-Gilpin	406	96.0	179.3	48.4
Nekoosa	933	11.5		
Oakville	925	13.3		
Ockley	274	66.7		
Ottokee	923	35.5		
Pike	344	12.1		
Rittman	733	68.3	29.5	34.7
Ross	204	10.4		
Rossmoyne	753	110.9	36.4	36.8
Russell	674	88.1	32.1	19.1
St. Clair	623T	13.9		
Sciotoville	363	11.8		
Seward	953	18.2		
Thackery	273	25.1		
Tuscarawas	4T3TC		10.9	
Wellston	404	55.2	69.1	18.9
Westmore	484	16.7	26.7	
Wheeling	364	45.4		
Woodsfield	474	10.0	24.1	
Wooster	714	194.3	73.5	47.8
Wynn	684	13.3	14.8	
Xenia	673	71.1		
Zanesville	413	30.8	52.8	10.8
Total (51 soils)		3070.4	1303.4	627.3
Total (all 138 soils)		3333.4	1516.3	817.6

*Includes only slopes 0-18% with none to moderate erosion and at least 10,000 acres in one of the land use categories listed. With good management, tillage group 1 soils should have yield response to no-tillage equal to or greater than conventional tillage.

sandy loam, or loamy fine sand surface texture. These soils are relatively low in organic matter and include glaciated, residual, and terrace soils. No recent alluvial soils are included.

Group 1 soils must have mulch cover for satisfactory no-tillage crop production. Mulch should cover 70% to 80% of the soil surface at planting time. This can be old crop residue, killed sod, dead weeds, or manure. If the site has less than 35% mulch cover, it should be tilled (disking and postplanting cultivation are satisfactory). These soils are listed in Table 1. Eighty-seven other soils would be in this tillage group but occupy less than 10,000 acres in any of the land use categories.

Tillage Group 2

With good management, soils in this group should have yield response to no-tillage nearly equal to conventional tillage, provided soil drainage has been improved by surface or subsurface drainage. These

TABLE 2.—Soils* of Tillage Group 2 in Thousands of Acres.

Soil Name	Soil No.	Cropland	Pasture	Idle
Bennington	692	269.5	64.6	46.5
Blount	6B2	1031.5	64.0	105.9
Colwood	9A8	15.8		
Crosby	602	419.0	22.8	50.0
Digby	2D2	22.2		
Fincastle	672	56.0		11.7
Fitchville	332	30.4		
Haskins	2A2	45.2		
Jimtown	322	12.8		
Kibbie	9A2	15.3		
Mermill	2A8	55.4		
Millgrove	2D8	22.0		
Nappanee	622T	68.0		
Platea	7B2	19.1	34.9	24.5
Randolph	642	13.0		
Ravenna	712	46.6	11.2	19.9
Rimer	952	33.4		
Sleeth	272	19.5		
Tedrow	922	11.9		
Venango	7A2	14.8		
Wadsworth	732	45.6	15.0	37.1
Wauseon	928	61.1		
Total (22 soils)		2328.1	212.5	295.6
Total (all 52 soils)		2408.1	270.7	379.3

*Includes only slopes 0-18% with none to moderate erosion and at least 10,000 acres in one of the land use categories listed. With good management, tillage group 2 soils should have yield response to no-tillage nearly equal to conventional tillage, provided soil drainage has been improved.

soils are somewhat poorly to poorly drained in the natural state (drainage classes 2 and 8). They have a silt loam, loam, sandy loam, or loamy fine sand surface texture. Hydraulic conductivity (saturated permeability) is equal or greater than 0.2 inches per hour within the top 2 feet of the profile. Soils in this group are relatively low in organic matter and include glaciated, residual, and terrace soils. No recent alluvial soils are included.

Mulch cover is important to proper performance of no-tillage on the lower organic matter soils (1.5 to 2.5%) in this grouping, as is the case with group 1. No-tillage corn following sod, or delaying planting with no-tillage until the latter part of the optimum planting period in areas where continuous row cropping is practiced, are excellent choices on these soils. Soils in tillage group 2 are listed in Table 2. Thirty other soils would be placed in this group but again have less than 10,000 acres in any of the land use categories.

TABLE 3.—Soils of Tillage Group 3 in Thousands of Acres.

Soil Name	Soil No.	Cropland*	Pasture	Idle
Allis	7C1			
Avonburg	752	83.3		15.8
Bartle	222			
Canadice	971			
Caneadea	972			
Clermont	751	109.1	12.1	20.5
Condit	691			
Damascus	321			
Danbury	9126P			
Frenchtown	711	10.1		13.5
Fulton	912	68.6		13.3
Ginat	361			
Johnsburg	402			
Mahoning	702	173.0	33.8	84.8
Nappanee	6226	28.8		
Purdy	391			
Remsen	7X2			
Roselms	632	31.3		
Sebring	331	10.6		
Sheffield	7B1	16.3	30.0	16.0
Trumbull	701	12.2		14.6
Tyler	392	16.3		
Total (all 22 soils)		590.7	138.6	224.4

*Yields have been lower on tillage group 3 soils with no-tillage when compared to conventional tillage.

Tillage Group 3

Soils in this group may yield less with no-tillage in comparison to conventional tillage and should not be considered for no-tillage under most circumstances. These soils are somewhat poorly to very poorly drained. Hydraulic conductivity (internal water movement) is so slow that even tile does not provide adequate drainage. Surface texture is primarily loam, silt loam, or silty clay loam. These soils are derived from glacial till or residual parent material. No recent alluvial soils are included. Most of these soils are relatively low in organic matter content.

All soils which should be in tillage group 3 are listed in Table 3, even though some occupy only a few hundred acres.

Tillage Group 4

Soils in this group (Table 4) may yield less with a no-tillage system in comparision to conventional tillage. These soils are very poorly drained and have surface textures of silty clay loam, clay loam, silty

TABLE 4.—Soils* of Tillage Group 4 in Thousands of Acres.

Soil Name	Soil No.	Cropland	Pasture	Idle
Abington	279	13.6		
Blanchester	757	19.7		
Brookston	608	58.5		
Hoytville	628	772.0		39.5
Latty	9L8	100.0		
Lenawee	9B8	35.2		
Lorain	978	12.3		
Luray	338	13.8		
Mahalasville	238	12.8		
Marengo	698	141.7	21.7	15.0
Mermill	2A87	38.9		
Millsdale	648	18.9		
Miner	707	21.7		
Monroeville	979	13.0		
Montgomery	218	37.0		
Patton	288	35.0		
Pewamo	6B8	671.8	37.3	53.3
Ragsdale	6T8	11.7		
Toledo	918	191.3		19.7
Westland	278	91.5		
Wetzel	627	35.9		
Total (21 soils)		2346.3	59.0	127.5
Total (all 31 soils)		2381.5	108.6	193.5

*Includes only slopes 0-18% with none to moderate erosion and at least 10,000 acres in one of the land use categories listed. Under some conditions, no-tillage may be a good alternative to conventional tillage on tillage group 4 soils.

clay, or clay. They contain relatively high amounts of organic matter in the surface. Soils developed in glacial till and residuum are included in this group, but alluvial soils are not. Corn on these soils does not respond to mulch cover where no-tillage is used, except perhaps for slower growth in cool, wet springs where mulch is present.

Although no-tillage should not be considered the first-choice system on these soils, it may be a good alternative under some conditions. These soils should be tilled in the fall or winter for best crop yields and timely planting. If fall, winter, or early spring tillage is not achieved, no-tillage has been a better choice than spring plowing the wet soil. Spring plowing usually results in poor seedbeds, reduced stands, and delayed planting. No-tillage becomes more favorable on these soils as the planting season advances if the soil was not previously plowed. Having equipment available which can be used for no-tillage planting may be a good choice for farms located on these soils, especially for seasons like 1973.

A tillage system for corn on group 4 soils which have adequate tile drainage to take advantage of the considerations noted above might be as follows:

- Fall or early spring tillage would be the first choice, particularly for continuous corn. Corn stalk areas should be tilled first.

- Soybean stubble, wheat stubble, or sod can be planted to corn with the no-tillage system without significant yield losses.

- Corn stalks not tilled by early May should be planted with little or no tillage to avoid delay in planting. For northern Ohio, corn yields decline approximately 1 bushel per acre for each day of delay beyond May 10 and 2 bushels per day of delay after May 20. These dates may be moved 5 to 10 days earlier for southern Ohio.

Tillage Group 5

This group includes miscellaneous soils not recommended for no-tillage at this time (Table 5). Included are organic soils, recent alluvial soils, strip mine land, and certain fine texture soils. There has been little or no experience with no-tillage on organic soil. Even with equivalent yields, higher rates of herbicides required for weed control with no-tillage may make no-tillage on organic soils a poor choice. Corn grown on well drained, recent alluvial soils should respond satisfactorily to no-tillage, but in a small number of tests this has not been observed. No reason is known for this poor response at this time.

Yields on poorly drained clays, such as Paulding, have not been satisfactory with no-tillage. Well drained soils where erosion has exposed a high clay subsoil probably should not be planted to row crops.

TABLE 5.—Soils* of Tillage Group 5 in Thousands of Acres.

Soil Name	Soil No.	Cropland	Pasture	Idle
Algiers	118	21.1		
Atkins	141		13.6	
Brooke-Upshur	506		21.4	
Chagrin	124	27.9		
Eel	103	33.7	10.2	
Genesee	104	75.9	22.8	21.3
Holly	121		16.4	
Huntington	154	19.9	13.6	
Linside	153	11.4		
Lobdell	123	19.3	17.8	
Lucas	913	22.2		
Mucks	600	70.4		12.3
Orrville	122	28.7	40.9	12.0
Papakating	128	15.1		
Paulding	638	146.7		11.8
Philo	143	20.2	23.4	
Pope	144	24.7	21.5	
Shoals	102	22.7	18.6	
Sloan	108	97.1	24.8	10.1
Stendall	142	24.6	33.0	11.9
Strip Mine	3RL		25.2	
Upshur-Gilpin	496	19.0	91.1	
Total (22 soils)		700.6	394.3	79.4
Total (all 79 soils)		797.6	525.1	190.6

*Includes only slopes 0-18% with none to moderate erosion and at least 10,000 acres in one of the land use categories listed. Tillage group 5 contains a miscellaneous collection of soils not recommended for no-tillage at this time.

No-tillage may do as well on these soils as any other system, but planter function with no-tillage has been a problem on these soils. Strip mine land is so variable that decisions for crop production must be made on an individual site basis.

DISTRIBUTION OF OHIO SOILS IN DIFFERENT TILLAGE GROUPS

Soils in the five tillage groups are not distributed uniformly across Ohio. The Ohio Conservation Needs Inventory information on soil type and acreage in each county was used to prepare a series of maps of the state depicting the distribution of soils falling into the several tillage groups. These maps indicate the amount of land (in thousands of acres per county) suitable for no-tillage crop production. Individual farmers who do not have soil maps of their farms should consult the Soil Conservation Service, U. S. Dept. of Agriculture, or Division of Lands and Soil, Ohio Dept. of Natural Resources, to determine specific soils on their land.

The following procedures and assumptions were used in deriving the values for the maps.

- Areas occupied by roads, built-up areas, urban areas, and federally owned lands not in crops were eliminated.
- No soils in tillage groups 3 and 5 were included.
- Soils with severe or gully erosion were not included.
- Slopes greater than 18% were not included. In this case, the assumption is that slopes up to 18% may be used for no-tillage without undue erosion but slopes more than 18% may be difficult for equipment operation.

Total land in tillage groups 1 and 2 is shown in Figure 1. The values in this map include all cropland, pasture, idle land, and privately owned or state forest land fitting the tillage groups as defined. Values noted here represent the *maximum potential* for no-tillage as the first choice tillage system for corn planting and include 10.5 million acres for the state. Inclusion of forested land does not constitute a recommendation for changing land use. Values range well over 100,000 acres for many counties and represent more than 50% of these land use categories with 0-18% slope in more than three-fourths of Ohio's counties.

The *current potential* for no-tillage corn production as a first choice system is shown in Figure 2. This includes tillage group 1 land in cropland and pasture as of 1967. This category covers more than 100,000 acres in each of 19 Ohio counties and 5.7 million acres in the state. Soils in this group are adequately drained, cleared of trees, and should be immediately available for no-tillage corn production for farmers desiring it.

With erosion control one of the important advantages of no-tillage, some land presently considered only for permanent vegetation cover because of erosion hazard should have potential for increased row crop production. Although erosion may occur from any tilled area, the hazard of erosion increases as the slope increases. Where no-tillage is used, tillage group 1 land with slopes ranging from 6% to 18% should be suitable for row crop production with much less erosion hazard than with conventional tillage. Cropland and pasture on tillage group 1 land with 6% to 18% slope is shown in Figure 3.

In 12 counties more than 50% of the cropland and pasture acreage of tillage group 1 land has slopes of 6% to 18%. One county contains more than 100,000 acres in this category and 16 counties contain more than 50,000 acres, with a total of 2.2 million acres for the state. Most of the soils with erosion hazard suited to no-tillage occur in southern and eastern Ohio.

FIG. 1.—Active and idle cropland, pasture, and forest as of 1967 which could be suitable for no-tillage corn production.*

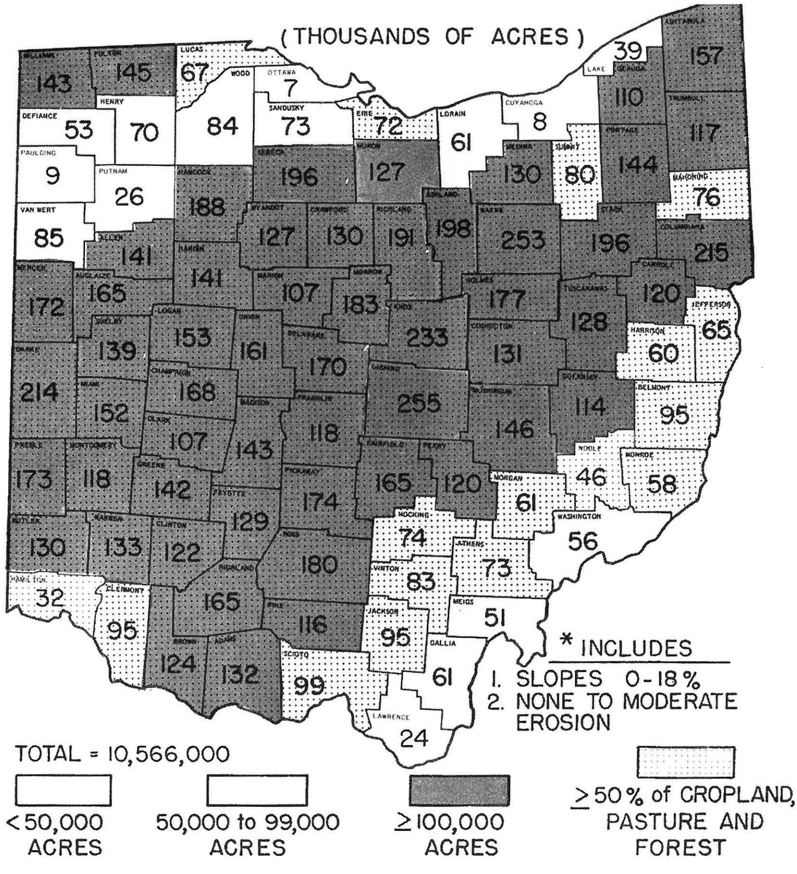


FIG. 2—Active and idle cropland and pasture as of 1967 on which no-tillage corn production should be equal to or greater than any other system.*

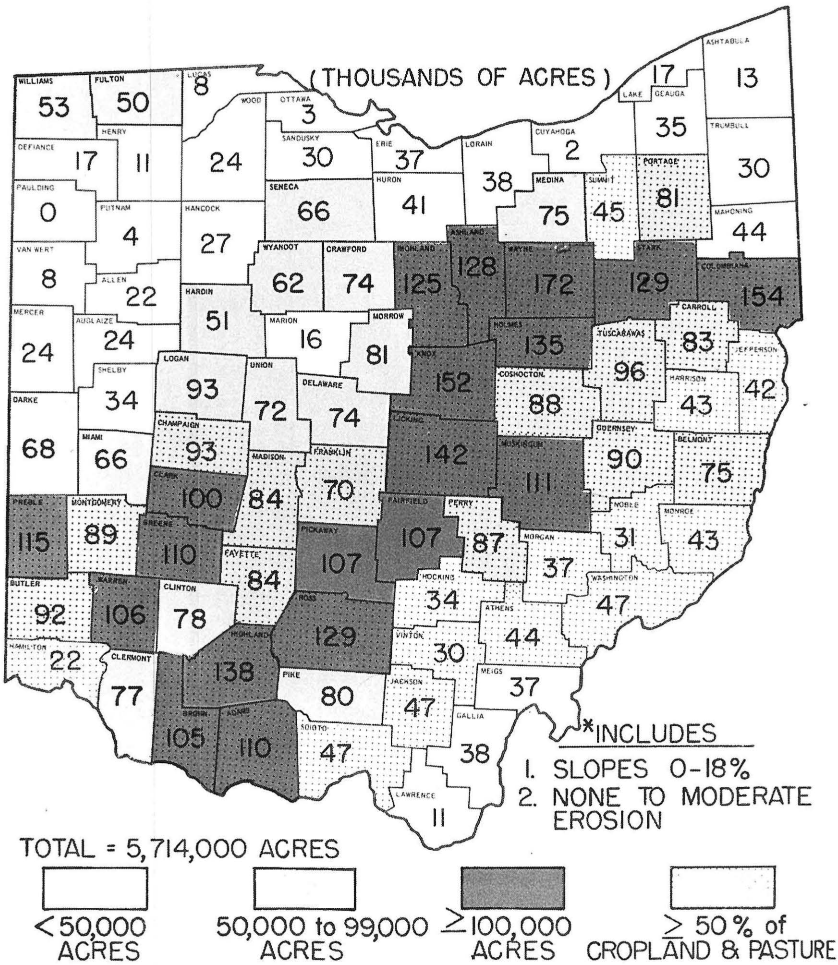
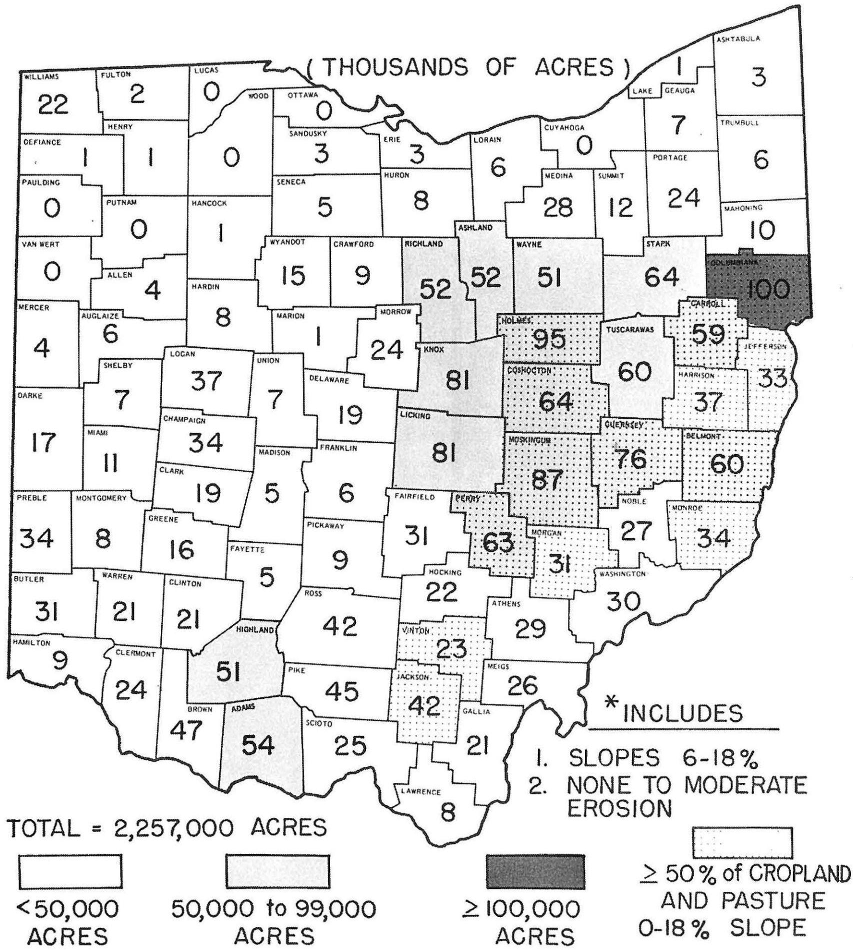
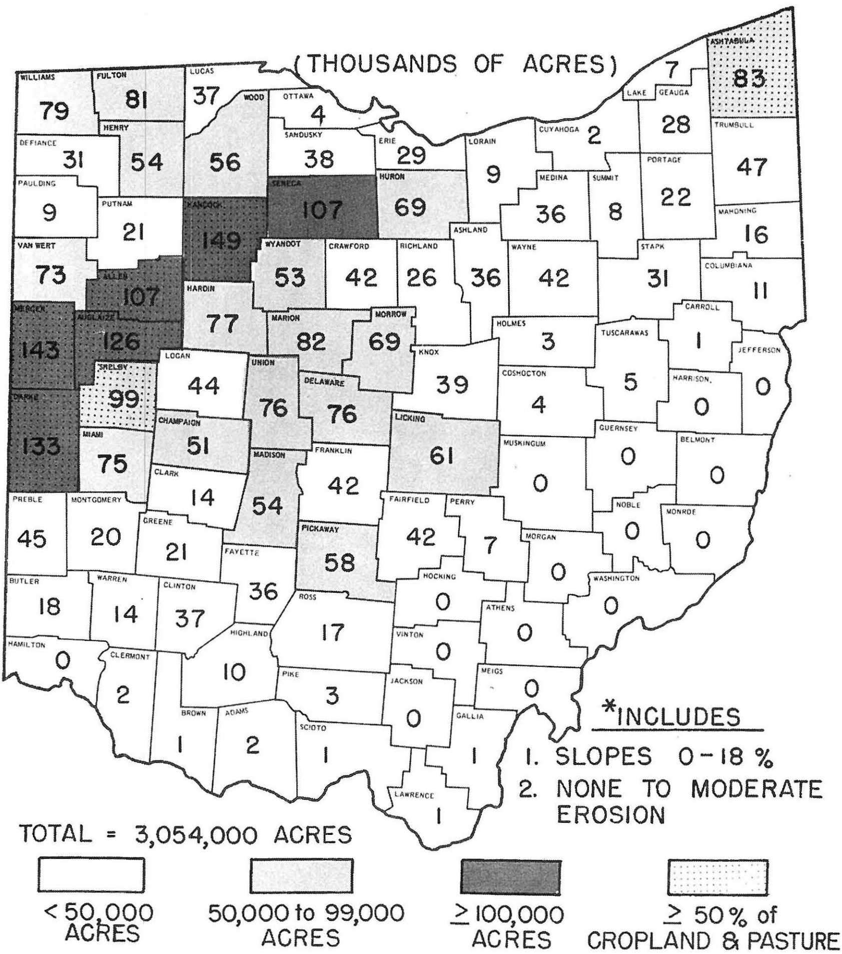


FIG. 3.—Active and idle cropland and pasture as of 1967 on which no-tillage corn should be equal to or greater than any other system and which should require erosion control practices.*



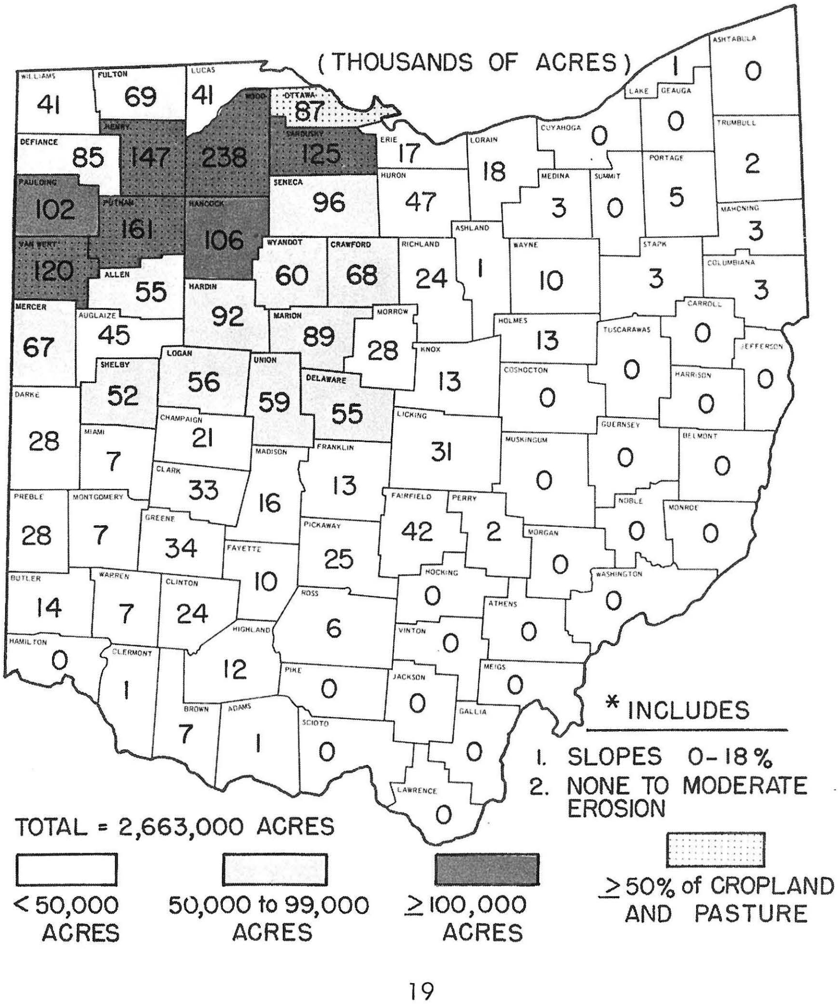
Land with good potential for no-tillage corn production if drainage is improved is shown in Figure 4. More than 50% of cropland and pasture acreage in seven counties is composed of tillage group 2 soils, with more than 100,000 acres in six counties. The largest concentration of tillage group 2 soils is found in northwestern Ohio.

FIG. 4.—Active and idle cropland and pasture as of 1967 which would be suitable for no-tillage if provided with adequate drainage.*



Although no-tillage is not the first choice on some of the dark colored, poorly drained soils, it is an attractive alternative to plowing in the spring at planting time for soils in tillage group 4. Distribution of soils in tillage group 4 is shown in Figure 5. Most of these are concentrated in northwestern Ohio and occur on 2.6 million acres. In five counties, more than 50% of the cropland and pasture acreage is in tillage group 4, with more than 100,000 acres in six counties.

FIG. 5.—Active and idle cropland and pasture as of 1967 on dark colored, very poorly drained land for which no-tillage would be a suitable, time saving alternate tillage practice.*



SUMMARY

Based on research and accumulated practical experience, there is a tremendous potential for no-tillage corn production in Ohio. First priority for shifting to a no-tillage corn production system should be on the well drained, sloping soils located primarily in eastern and southern Ohio. With no-tillage, expanded corn acreage is possible on many sites previously used only for perennial vegetation.

No-tillage should not be the first choice on many of the poorly drained soils, but can aid in timely planting during seasons when plowing is delayed until planting time. A considerable area of northern and western Ohio contains soils in this category.

Good management is necessary for satisfactory crop production with any tillage system. No-tillage requires learning new skills in planting as well as insect and weed control. Correct planting date, selection of a herbicide system suited to the vegetation present, control of insect pests, adequate nutrients, and selection of tillage systems based on soil characteristics are all important. When used properly, no-tillage offers Ohio farmers a management tool which can help solve some current crop production problems.

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Center Headquarters, Wooster, Wayne County: 1953 acres

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Green Springs Crops Research Unit, Green Springs, Sandusky County: 26 acres

Jackson Branch, Jackson, Jackson County: 344 acres

Mahoning County Farm, Canfield: 275 acres

Muck Crops Branch, Willard, Huron County: 15 acres

North Central Branch, Vickery, Erie County: 335 acres

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Pomerene Forest Laboratory, Keene Township, Coshocton County: 227 acres

Southeastern Branch, Carpenter, Meigs County: 330 acres

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Western Branch, South Charleston, Clark County: 428 acres